REMARKS/ARGUMENTS

Status of the Claims

Upon entry of the present amendment, claims 1-2, 4-5, 8, 31-32, 34 and 36-44 are pending. Claims 1-2, 8, 31 and 44 are amended. Claims 3, 6-7, 9-30, 33 and 35 are canceled without disclaimer or prejudice to renewal. Claims 1-2, 4-5 and 8 are presented for examination. Claims 31-32, 34 and 36-44 are withdrawn as directed to a non-elected invention.

Support for amending claims 1, 31 and 44 is found, for example, on page 7, lines 9-31; on page 37, line 1; on page 57, lines 25-26; and in claim 7 as originally filed.

Claim 2 is amended for proper antecedent basis.

Claim 8 is amended to correct typographical errors. Support is found, for example, on page 4, lines 27-28.

No new matter is added by the present amendments, and the Examiner is respectfully requested to enter them.

Rejection under 35 U.S.C.§ 112, first paragraph, written description

The Examiner has rejected claims 1-2, 4-5 and 7-8 under 35 U.S.C. § 112, first paragraph, as allegedly failing to comply with the written description requirement. To the extent that the present rejection applies to the amended claims, Applicants respectfully traverse.

To satisfy the written description requirement, an applicant must convey with reasonable clarity to those skilled in the art that, as of the filing date sought, he or she was in possession of the invention. *Vas-Cath, Inc. v. Mahurkar*, 935 F.2d 1555, 1563-64, 19 USPQ2d 1111, 1117 (Fed. Cir. 1991). Possession may be shown in a variety of ways including description of an actual reduction to practice, or by showing that the invention was "ready for patenting" such as by the disclosure of drawings or structural chemical formulas that show that the invention was complete, or by describing distinguishing identifying characteristics sufficient to show that the applicant was in possession of the claimed invention. *See, e.g., Pfaff v. Wells Elecs., Inc.*, 525 U.S. 55, 68, 119 S.Ct. 304, 312, 48 USPQ2d 1641, 1647 (1998); *Regents of the University of California v. Eli Lilly*, 119 F.3d 1559, 1568, 43 USPQ2d 1398, 1406 (Fed. Cir.

1997); *Amgen, Inc. v. Chugai Pharmaceutical*, 927 F.2d 1200, 1206, 18 USPQ2d 1016, 1021 (Fed. Cir. 1991). Furthermore, a patent need not teach, and preferably omits, what is well known in the art. *In re Buchner*, 929 F.2d 660, 661, 18 USPQ2d 1331, 1332 (Fed. Cir. 1991); *Hybritech, Inc. v. Monoclonal Antibodies, Inc.*, 802 F.2d 1367, 1384, 231 USPQ 81, 94 (Fed. Cir. 1986).

The Examiner alleges that the specification teaches only reactions of GDP-fucose donor substrates reacting with acceptor substrates comprising a N-acetylglucosamine (GlcNAc). Applicants respectfully disagree with the Examiner. However, in the interest of furthering prosecution, Applicants have amended claims 1, 31 and 44 to set forth that the donor substrate is a GDP-fucose residue and the acceptor substrate comprises a GlcNAc residue.

With respect to the genus of recombinant fucosyltransferase proteins, Applicants have shown possession of a polypeptide having at least 90% amino acid sequence identity to the fucosyltransferase from *H. pylori* strain 1111A (SEQ ID NO:4). It is well settled that possession of a genus may be satisfied through sufficient description of a "representative number of species," for example, by disclosure of relevant, identifying characteristics, *i.e.*, structure or other physical and/or chemical properties, by functional characteristics coupled with known or disclosed correlation between function and structure, or by a combination of such identifying characteristics sufficient to show the applicant was in possession of the claimed genus. In other words, possession of a genus can be evidenced by describing the distinguishing identifying characteristics common to the genus encompassed.

What constitutes a representative number is an inverse function of the skill and knowledge in the art. Satisfactory disclosure of a representative number of species depends on whether one of skill in the art would recognize that the applicant was in possession of the necessary common attributes or features of the elements possessed by the members of the genus in view of the species disclosed.

In this case, the claims encompass methods of using a genus of polypeptides having at least 90% sequence identity to the alpha-1,3/4-fucosyltransferase from *H. pylori* strain 1111A (SEQ ID NO:4). Members of the claimed genus are expressly defined both in terms of structure (*e.g.*, having at least 90% identity to SEQ ID NO:4) and function (*e.g.*, transfers a

fucose residue from GDP-fucose to an acceptor substrate comprising a GlcNAc residue). Thus, one skilled in the art would expect the claimed genus to have only limited variation. Moreover, those of skill understood the common structural features of *H. pylori* alpha-1,3/4-fucosyltransferases at the time of filing of the present application. For example, those of skill understood that the catalytic domain of alpha-1,3/4-fucosyltransferases to be highly conserved, as represented by the consensus sequence of a glycosyltransferase family 10 polypeptide. *See*, the Specification at paragraph [0037], page 7, line 32 through page 8, line 4; paragraph [0059], page 14, lines 8-31. The Specification teaches that the catalytic domain of the fucosyltransferase from *H. pylori* strain 1111A (SEQ ID NO:4) is located between residues 27-304. *See*, the Specification at page 14, lines 25-26. To that end, the Examiner's attention is respectfully directed to Example 11B of the Written Description Training Materials, Revision 1, published March 25, 2008 (*found at* http://www.uspto.gov/web/menu/written.pdf). *See*, pages 40-42 of the Training Materials.

Example 11B of the Training Materials analyzes a claim directed to a genus of nucleic acids that encode protein having at least **85%** identity to a particular disclosed sequence and wherein an art-recognized structure-function correlation is present. Example 11B notes that the hypothetical specification discloses data from deletion studies that identify conserved domains important for activity. In the analysis of Example 11B, the USPTO reasons that a single SEQ ID NO coupled with the knowledge in the art is sufficient to put one in possession of the genus of nucleic acids encoding the genus of polypeptides, whether or not the polypeptide activity was recited in the claim.

Applicants' claims are analogous to the claim of Example 11B of the Written Description Training Materials in that they set forth a protein having (a) a specifically identified structure, namely at least **90%** identity to SEQ ID NO: 4, and (b) a specifically identified function, namely the transfer of a fucose residue to an acceptor substrate comprising a GlcNAc. The numerous species of alpha-1,3/4-fucosyltransferases taught in the present application, as well as an identified family consensus sequence (*i.e.*, glycosyltransferase family 10), demonstrates that an art-recognized structure-function correlation is present. The Specification teaches that the alpha-1,3/4-fucosyltransferases described share a highly conserved catalytic

domain that defines them as fucosyltransferases. *See*, paragraph [0037] at page 7, line 32 through page 8, line 4 and Figures 8-11. The location of the highly conserved catalytic domain in the alpha-1,3/4-fucosyltransferases from at least four *H. pylori* strains is taught in paragraph [0059] on page 14, lines 8-31. Moreover, the Specification provides in Figure 12 an alignment of seven different alpha-1,3/4-fucosyltransferases from seven *H. pylori* strains, including 1182B, 1111A, 1218B, 19C2B, 915A, 26695A and 19C2A, showing which residues are conserved (and should not be altered), and which residues are not conserved (and therefore can be altered). Applicants' Specification also provides several alpha-1,3/4-fucosyltransferases with less than 90% sequence identity to SEQ ID NO:4 and that have the activity of transferring a fucose residue from a donor substrate to an acceptor substrate comprising a GlcNAc residue. Therefore, following the reasoning provided by the USPTO in Example 11B of the Training Materials, Applicants have demonstrated possession of a method of using a genus of alpha-1,3/4-fucosyltransferases having at least 90% sequence identity to SEQ ID NO:4.

In view of the amendments to the claims, what was known in the art and what is taught in the specification regarding the different alpha-1,3/4-fucosyltransferases, Applicants respectfully submit that the specification conveys possession to those of skill methods of using an alpha-1,3/4-fucosyltransferase from has at least 90% sequence identity to SEQ ID NO:4, commensurate with the scope of the claims. Accordingly, the Examiner is respectfully requested to withdraw this rejection.

Rejection under 35 U.S.C.§ 112, first paragraph, enablement

The Examiner has rejected claims 1-2, 4-5 and 7-8 under 35 U.S.C. § 112, first paragraph, as allegedly failing to comply with the enablement requirement. To the extent that the present rejection applies to the amended claims, Applicants respectfully traverse.

In order to establish a *prima facie* case of lack of enablement, the Examiner has the burden to establish a reasonable basis to question the enablement provided for the claimed invention. *In re Wright*, 27 USPQ 1510, 1513 (Fed. Cir. 1993). As set forth in MPEP § 2164.01, "the test of enablement is not whether any experimentation is necessary, but whether...it is undue." The "fact that experimentation may be complex does not necessarily

make it undue, if the art typically engages in such experimentation" (citations omitted). Further, a patent need not teach, and preferably omits, what is well known in the art. *Hybritech, Inc. v. Monoclonal Antibodies, Inc.*, 231 USPQ 81, 94 (Fed. Cir. 1986). Finally, claims reading on inoperative embodiments are enabled if the skilled artisan understands how to avoid inoperative embodiments. *See, e.g., In re Cook and Merigold*, 169 USPQ 299, 301 (C.C.P.A. 1971).

Applicant's respectfully disagree with the Examiner's position. Applicants respectfully submit that the claims are commensurate in scope with the teachings of the present Specification and what was known in the art at the time of filing of the application. Applicants' position is supported by the "Training Materials For Examining Patent Applications With Respect To 35 USC § 112, First Paragraph - Enablement Chemical/Biotechnical Applications,"[1] which sets forth an enablement decision tree that first asks the question: "Does the specification teach how to make and use at least one embodiment encompassed by the claims as a whole without undue experimentation?" A note to the question states that "if there is a working example, the answer to the question cannot be 'NO'."

Herein, Applicants provide general guidance as to how to make and use at least seven different alpha-1,3/4-fucosyltransferases from seven different *H. pylori* species, including *H. pylori* strains 1182B, 1111A, 1218B, 19C2B, 915A, 26695A and 19C2A. Six of the *H. pylori* alpha-1,3/4-fucosyltransferases have less than 90% sequence identity to SEQ ID NO:4, and one alpha-1,3/4-fucosyltransferase from has at least 90% sequence identity to SEQ ID NO:4. *See*, the Specification at page 5, lines 1-16; at Examples 1 and 2 on pages 57-58; and Figures 1-12. Accordingly, the answer to the first question is necessarily "YES."

The second question in the enablement decision tree is: "Are the enabled embodiments representative of the full scope of the claim?" The high degree of sequence identity required by the claims (at least 90% sequence identity to SEQ ID NO:4), coupled with the specified restriction on function (the ability to transfer a fucose residue from a GDP-fucose substrate to an acceptor substrate comprising a GlcNAc residue), results in a genus of structurally similar polypeptides. As discussed above, Applicants have amended claims 1, 31 and 44 to set forth that the donor substrate is GDP-fucose, and that the acceptor substrate

comprises a GlcNAc. Accordingly, a person of skill in the art would not expect substantial variation among species within the genus. In that Applicants have taught in the present Specification how to make and use at least seven embodiments of alpha-1,3/4-fucosyltransferases from *H. pylori*, six of which have less than 90% sequence identity to SEQ ID NO:4, and at least one embodiment of an alpha-1,3/4-fucosyltransferase from *H. pylori* having at least 90% sequence identity to SEQ ID NO:4—each alpha-1,3/4-fucosyltransferase having a similar structure and function—the answer to this second question is necessarily "YES." Thus, following the guidelines of the enablement decision tree, Applicants respectfully submit that no enablement rejection should be made under these circumstances.

Moreover, Applicants have shown those of skill how to make and to use a recombinant fucosyltransferase having at least 90% amino acid sequence identity to SEQ ID NO:4. Applicants describe the basic structural characteristics of the alpha-1,3/4-fucosyltransferase polypeptides, including the alpha-1,3/4-fucosyltransferase from *H. pylori* strain 1111A (SEQ ID NO:4). Applicants teach that the catalytic domains of the alpha-1,3/4-fucosyltransferases are highly conserved and are within the family of glycosyltransferase family 10. *See*, the Specification at paragraph [0059] at page 14, lines 8-31. The catalytic domain of the fucosyltransferase from *H. pylori* strain 1111A (SEQ ID NO:4) is at residues 27-304. *See*, *e.g.*, the Specification at page 14, line 26. Alignments of the amino acid sequence of the fucosyltransferase from *H. pylori* strain 1111A (SEQ ID NO:4) with the consensus sequence for glycosyltransferase family 10 is shown in Figure 9 and with other alpha-1,3/4-fucosyltransferases expressed in *H. pylori* is shown in Figure 12. Applicants also teach that the functional domains of the *H. pylori* alpha-1,3/4-fucosyltransferases can be identified using standard methodologies known in the art. *See*, paragraph [0090] at page 25, line 17-24.

Therefore, it is clear that several *H. pylori* alpha-1,3/4-fucosyltransferases were structurally characterized in several *H. pylori* species and that the present inventors were able to use the previously identified *H. pylori* alpha-1,3/4-fucosyltransferases to identify the fucosyltransferase from *H. pylori* strain 1111A (SEQ ID NO:4). *See*, *e.g.*, paragraph [0196] at page 57, lines 5-10. Because the basic structural characteristics of several *H. pylori* alpha-1,3/4-

[1] Enablement Training Materials are found at http://www.uspto.gov/web/offices/pac/dapp/1pecba.htm.

fucosyltransferases have been described, those of skill would recognize which residues could be substituted or removed (*e.g.*, residues outside of the catalytic domain or those not conserved in the alignments shown in Figures 9 or 12) and which residues should be conserved (*e.g.*, residues within the catalytic domain or those conserved in the alignments shown in Figures 9 or 12), while still retaining their function to transfer a fucose residue from a donor substrate to an acceptor substrate.

In view of the foregoing, Applicants respectfully submit that the specification teaches those of skill how to make and use an alpha-1,3/4-fucosyltransferase from has at least 90% sequence identity to SEQ ID NO:4, commensurate with the scope of the claims. Accordingly, the Examiner is respectfully requested to withdraw this rejection.

Request for Rejoinder

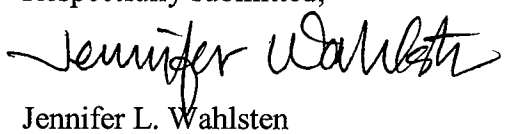
Claims 31-32, 34 and 36-44 are withdrawn from examination as being drawn to non-elected inventions. Claims 1-2, 4-5, 8 and 31-32, 34 and 36-44 are related as methods of use. Upon entry of the present amendments, Applicants believe that method claims 1-2, 4-5 and 8 are allowable. Accordingly, pursuant to M.P.E.P. § 821.04, Applicants respectfully request withdrawal of the restriction requirement with respect to composition claims 1-2, 4-5, 8 and 31-32, 34 and 36-44, and examination of the withdrawn methods of use claims. In accordance with M.P.E.P. § 821.04, Applicants have amended claims 31 and 44 such that their scope corresponds to claim 1.

CONCLUSION

In view of the foregoing, Applicants believe all claims now pending in this Application are in condition for allowance. The issuance of a formal Notice of Allowance at an early date is respectfully requested.

If the Examiner believes a telephone conference would expedite prosecution of this application, please telephone the undersigned at 415-576-0200.

Respectfully submitted,



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